

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

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|---------------|--|------------------------|
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| Title: | PROCESS FOR THE REGENERATION OF PLATINUM GROUP METAL SUSPENSION CATALYSTS | |
| Docket No.: | 032301.250 | |
| Customer No.: | 25461 | |

MAIL STOP APPEAL BRIEF-PATENTS

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APPELLANT'S BRIEF ON APPEAL

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Susan J. Revell

LIT/959499.1

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Wikysedia
Dictionary.com
MSN Emcarta

all submitted with Amendment of April 5, 2006

APPELLANT'S BRIEF ON APPEAL

A. INTRODUCTION

This appeal is from an Official Action from the U. S. Patent and Trademark Office dated December 20, 2005, finally rejecting Claims 1, 3 to 6, 9 and 11 to 13 under 35 U.S.C. § 103(a) as unpatentable in view of the British patent of *Davies*, GB 1,090,294, taken with *Clough*, US 5,279,803.

1. Real Party in Interest

The real party in interest for this appeal and in the present application is Degussa AG of Düsseldorf, Germany, as evidenced by the Assignment recorded at the U. S. Patent and Trademark Office on April 23, 2002, at Reel 012922, Frame 0291.

2. Related Appeals and Interferences

The appellant, appellant's legal representatives and the assignee are not aware of any related appeals or interferences that will be directly affected or have a bearing on the Board's decision in this appeal.

3. Status of Claims

Claims 1, 3-6, 9 and 11-13 stand rejected and are on appeal. The rejected claims are set forth in Appendix A.

Claims 2, 7, 8 and 10 stand objected to and would be allowable if rewritten in independent form. Claims 2, 7, 8 and 10 are included in Appendix A.

4. Status of Amendments

An Amendment After Final Under 37 C.F.R. § 1.116 was filed on April 5, 2006, and according to the Advisory Action of April 24 2006, has been entered. Thus, the status of the claims is as shown in the Amendment After Final which was submitted April 5, 2006.

B. SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent Claim 1 is directed to the process for the regeneration of a supported or unsupported suspension catalyst containing at least one platinum group metal where the process comprises dissolving the platinum group metals in aqueous hydrochloric acid (HCl) using an oxidizing agent for platinum group metals followed by filtration of insoluble constituents and precipitation of the platinum group metals by means of a reducing agent at a pH in the range of from 2 to 10. The precipitation is carried out in the presence of a chelating agent for one or more metals from the series of metals of groups 2a, 3a, 4a of the Periodic System and Transition Elements. This is disclosed in the application on page 3, beginning at line 30, to page 4, lines 1 to 6.

Dependent Claim 2 is based on Claim 1 and further specifies that the unsupported catalyst is based on at least 50 wt. % of palladium, 0 to less than 50 wt. % of one or more platinum group metals and 0.001% to 10 wt. % of at least one metal capable of forming complexes from the series of groups 2a, 3a, and 4a of the Periodic System and Transition Elements, without elements of the platinum group. The catalyst is regenerated by carrying out precipitation in the presence of at least a stoichiometric amount of the chelating agent and at least one of the non-platinum group metals present. This is based on the disclosure found on page 4, lines 7 to 13.

Claim 3 is dependent on Claim 1 and specifies that the oxidizing agent used is chlorine or hydrogen peroxide and the reducing agent used is an aldehyde such as formaldehyde, a formate or formic acid, a hydride or hydrogen. Basis is found in the application on page 5, lines 7 to 9 and lines 10 to 16.

Dependent Claim 4 differs from Claim 1 by specifying that the chelating agent is selected from the group consisting of aminopolycarboxylic acids, polyhydroxycarboxylic acids and aminopolyphosphonic acids. Basis is found in the application on page 4, beginning at line 27.

Dependent Claim 5 depends on Claim 4 and specifies further details as to the chelating agent and lists the number of compounds as representative chelating agents. Basis for this description is found on page 4, beginning at line 27 and continuing to page 5, lines 1-6.

Dependent Claim 6 differs from Claim 1 by specifying the reducing agent being selected from the group consisting of formaldehyde, formate and formic acid and the pH being raised continuously or in stages from 2 to 3 to 8 to 9 during the addition of the reducing agent. This is based on the disclosure on page 5, lines 17 to 26, in the application.

Claims 7 and 8 depend from Claim 2 and further specify particular oxidizing agents and chelating agents, respectively. Basis is found on page 5, lines 7 to 16, and page 4, beginning at line 27, respectively.

Claim 9 depends from Claim 3 and further defines the chelating agent as disclosed on page 4, beginning at line 27.

Claim 10 depends on Claim 2 and further specifies the reducing agent and pH conditions. Basis is found on page 5, lines 17 to 26.

Claims 11 and 12 depend on Claim 3 and Claim 4, respectively, and define the reducing agent and pH conditions as disclosed on page 5, lines 17 to 26.

Claim 13 depends on Claim 5 and defines the reducing agent and pH condition found on page 5, lines 17 to 26.

C. GROUND'S OF REJECTION TO BE REVIEWED ON APPEAL

In the final rejection, Claims 1, 3-6, 9 and 11-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the British patent '294 in view of *Clough* '803. It was also indicated that Claims 2, 7, 8 and 10 would be allowable if rewritten in independent form.

Therefore, the issue on appeal is whether Claims 1 to 13 are rendered *prima facie* obvious in view of *Davies* (GB '294) taken with *Clough* '803.

For purposes of this appeal, all claims stand or fall together.

D. ARGUMENT

The Final Official Action relies on the British patent of *Davies* (GB 1,090,294), taken with *Clough* (US 5,279,803). Appellants respectfully submit that the references fail to establish *prima facie* obviousness of the claimed invention.

Briefly summarized, the invention as set forth in Claim 1 of the original application is directed to a process for the regeneration of a supported or unsupported suspension catalyst containing at least one platinum group metal. The process is carried out by dissolution of the platinum group metals present in the catalyst in an aqueous hydrochloric acid. An oxidizing agent, such as chlorine or hydrogen peroxide, is used for the platinum group metals and this is followed by filtration of insoluble constituents and precipitation of the platinum group metals by

means of a reducing agent, such as an aldehyde, at a pH in the range of 2-10. An important feature of the invention resides in carrying out the precipitation step in the presence of a chelating agent for one or more metals selected from the group consisting of group 2a, 3a, and 4a of the Periodic System and Transition Elements.

It is important to establish at the outset a clear and unambiguous distinction between the terms "chelating agent" as used in this application and the term "metal chelate complex" as used in *Clough* to properly construe pending Claim 1. The term "chelating agent" must be given its plain and ordinary meaning. Of record herein are copies of three dictionary entries (Wikipedia, dictionary.com and MSN Encarta) which all prove that the term "chelating agent" refers to a compound which combines with a metal to form a chelate. The resulting chelate is called a metal complex. Therefore, there can be no doubt that a skilled person will understand the term "chelating agent" in Claim 1 as different from a metal complex (the chelate). The issue in this case comes down to a clear and unambiguous distinction between the term "chelating agent" and the term "metal chelate complex". Copies of these published definitions are attached.

The Official Action alleges that *Davies* discloses a process for the recovery of at least one platinum group metal, such as palladium, platinum or gold from catalysts which are supported in finely divided form on a carrier. The *Davies* process as described in the Final Official Action is carried out by treating the catalyst in an aqueous medium of HCl and hydrogen peroxide, in the presence of an oxidizing agent. *Davies* also discloses carrying out a filtration step and a precipitation step of the platinum group metals. The reducing agent used is formaldehyde.

Davies does not disclose utilizing the reducing agent at a pH in the range of 2 to 10 in the presence of a chelating agent.

The Final Official Action relies on *Clough* for disclosure of a process for recovering precious metals such as platinum group metals. According to the Final Action, page 3, second paragraph: "*Clough* continues to teach wherein the recovery of the metal is carried out using a chelating agent along with a transition metal, wherein the pH can be maintained within the range of from 1-10." The chelating agent, according to the Final Official Action, can be citric acid, tartaric acid, as well as nitrilotriacetic acids.

The Final Action concludes, at the bottom of page 3, that it would have been obvious to utilize a chelating agent during the precipitation step of *Davies* because *Clough* allegedly teaches a process for recovering precious metals such as the platinum group metals where the recovery of the metal is carried out using a chelating agent along with a transition metal and where the pH may be maintained within the range of 1 to 10.

The Final Action further contends that the modification would have been obvious because one of ordinary skill in the art would have expected a process for recovering platinum group metals as taught by *Clough* to have been similarly useful and applicable to a process for recovering platinum group metals as shown by *Davies*, see page 4.

However, appellants respectfully submit that the disclosure of *Clough* has not been properly construed.

There is no disclosure in *Clough* of using a chelating agent for precious metal recovery. *Clough* teaches a process for recovering precious metals from carbonaceous ores with at least

one added metal component in an amount effective to at least promote the oxidation of the carbonaceous material (col. 1, lines 55-60; Claim 1).

Clough further teaches that the metal component can be a complex formed of a metal with a ligand. Iron, copper, cobalt, vanadium or manganese are mentioned as the metals that can be complexed with ligands (col. 4, lines 30-39). Chelating ligands are mentioned as examples of ligands that form complexes with metals (col. 4, line 40 to col. 5, line 2).

Clough also teaches that not all of the metal has to be complexed, but some of the metal can be non-complexed (col. 5, lines 16 to 32) as is apparent from the preferred metal to ligand ratios (col. 5, lines 25 to 32).

All this disclosure is related to use of metal complexes in the *Clough* system. The metal complexes disclosed by *Clough* are chemical compounds formed by a reaction of metals with ligands and not merely mixtures of a chelating agent and a transition metal.

It is further to be noted that *Clough* only teaches the usefulness of metal complexes for pretreating a carbonaceous ore, but does not disclose or suggest that a benefit could be obtained by the presence of such metal complex in the subsequent processing steps of dissolving the platinum group metal and precipitating the platinum group metal. *Clough* clearly teaches that the benefits of using the metal complexes are obtained when the steps of dissolving the platinum group metal and precipitating the platinum group metal are carried out in the absence of the metal complex (col. 10, lines 37-61) and the preferred embodiment is directed to such process, where dissolving of the platinum group metal and precipitating the platinum group metal is carried out in the absence of the metal chelate (col. 11, line 13 - col. 12, line 19).

Therefore, *Clough* would not motivate a skilled person to use the disclosed metal complexes on anything else but a carbonaceous ore as a pretreatment. A skilled person also would not be motivated to use the metal complex in a processing step after solid material has been removed, because he would not expect them to have any useful effect in such step based on the teachings of *Clough*.

Still further, appellants submit that a skilled person would not consider employing the metal complexes of *Clough* in the dissolution step of *Davies* based on common knowledge of the decomposing action of transition metals on hydrogen peroxide. It is common knowledge that iron, copper and manganese ions are strong catalysts for decomposing hydrogen peroxide. (*Ullmann's Encyclopedia of Industrial Chemistry*, 5th Ed., Vol. A13, pages 446-447 of record). Therefore a skilled person would not consider adding compounds of these metals to the process of *Davies* where hydrogen peroxide is a reagent, because he would expect them to have a detrimental effect due to hydrogen peroxide decomposition.

It is of particular importance to note that the *Clough* process is related to a distinctly different technology from that presented in the present application. Appellants' process relates to the regeneration of a suspension catalyst containing a platinum group metal. The *Clough* invention relates to a process for recovering precious metals from an ore containing carbonaceous materials. See the Abstract on page 1 of the patent. As pointed out in col. 1, beginning at line 28, carbonaceous ores contain elemental carbon such as graphite or organic compounds and it is the presence of the carbon and organic compounds that makes it difficult and expensive to recover valuable metals such as the precious metals.

In order to present a process which is said to be an advance over prior methods for recovering of precious metals from carbonaceous ores, *Clough* suggests contacting the ore with at least one added metal component in an amount effective to promote oxidation of the carbonaceous material. See col. 1, lines 55-66. The conditions necessary to carry out the *Clough* process include chemically oxidizing at least a portion of the carbonaceous materials and then at least partially liberating the metal to be recovered from the ore. The second step involves actual recovering of the precious metals.

Note that when *Clough* uses the term "at least partially liberate the metal to be recovered from the ore", he means to place the precious material in the ore in a condition which is more susceptible to recovery, for example, by cyanidation, than without the pretreatment. Thus, *Clough* does not "liberate" the precious metal by dissolving the precious metal, but instead makes the precious metal more accessible to a subsequent dissolving step. For example, *Clough* discloses that in one embodiment, the contacting of the carbonaceous ore can be with a gaseous source of oxygen such as air or oxygen. See col. 1, beginning at line 67.

Clough discloses that an improved rate of oxidation including solubilization or conversion to a different form, for example, solids, accomplishes an improved rate of oxidation of the carbonaceous material and the yield/recovery of the desired metal as the function of time is substantial. See col. 2, lines 30-37.

The reference further teaches that the process as described therein is intended as an improvement over the previous chlorination/oxidation procedures which require a substantial amount of chemicals and other expensive technology.

Clearly, the combination of *Clough* with *Davies* would not motivate a person skilled in the art to (1) replace the metal chelate complex of *Clough* from the carbonaceous pretreating step, (2) select instead a chelating agent and (3) add the chelating agent to the *Davies* recovery procedure. Thus, at least three distinct steps would be necessary to modify the *Davies* process. There is nothing in either reference that leads a person skilled in the art to replacing a metal chelate complex in a pretreatment step by a chelating agent from a recovery step with the expectation of a successful result.

Clough discloses as an example of the specific conditions of the invention, the use of iron, copper or cobalt with a chelating agent as shown in col. 4, lines 30-68. In these metal complexes, all the ligand is bound to the metal, as becomes apparent from the metal to ligand mole ratios of from 1 to 3 disclosed in col. 5, lines 25-32. There is no suggestion in the *Clough* reference to use a ligand that is not complexed to a metal.

A person skilled in the art would understand that a chelating agent is a compound that is capable of binding to a metal forming a polydentate metal complex. See the definitions of "chelating agent" from Wikipedia, dictionary.com and MSN Encarta. Thus, the metal complexes of *Clough* are not encompassed by the art recognized definition of chelating agents because they already contain a metal and, therefore, are not capable of binding further amounts of metal.

Furthermore, even if a skilled person would combine the *Clough* reference with the *Davies* reference as suggested in the Final Action using one of the metal complexes as disclosed by *Clough* as an additive in the *Davies* process, it would still not arrive at the claimed subject matter since the metal complexes of *Clough* are not chelating agents as defined in the application

that are capable of complexing any further metal. Note that appellants' claims herein specify that the precipitation is carried out in the presence of the chelating agent for one or more metals from the indicated members of the Periodic System. The metal complexes of *Clough* do not meet that qualification.

The secondary reference of *Clough* teaches that the metal contained in the metal complex is an essential element of the process. Consequently, a person skilled in the art would not consider using only a ligand in place of the metal complex based on the teachings of *Clough*.

In the advisory action of April 24, 2006, it was said that appellants' arguments were not persuasive because the claims do not recite a "metal-free" chelating agent. However, it is clear from the evidence that has been filed; namely, the three definitions of "chelating agent", that the chelating agents as defined in this application are not metal complexes. Therefore, there is no need to recite that the chelating agent is "metal free" because by definition, it is "metal free". To recite metal free chelating agent would be a redundancy and unnecessary since a person skilled in the art would understand what is meant by "chelating agent" as shown by the definitions of record herein.

The advisory action also alleges that appellants' have admitted that both metal complexes and chelating ligands are disclosed in the reference of *Clough*. Appellants have pointed out that metal complexes are disclosed in *Clough* and it is the metal complexes that are used for the process for the regeneration of a suspension catalyst.

The record is clear and unambiguous. *Clough* does not disclose using a chelating agent in the process to regenerate a suspension catalyst. The only substance described by *Clough* is a

metal complex. Appellants do not use a metal complex. Thus, the issue is simple and should be resolved in Appellants' favor.

E. CONCLUSION

For reasons discussed above, appellants respectfully submit that Claims 1 to 13 are not rendered *prima facie* obvious by the combination of references relied on in the final rejection. Appellants therefore respectfully request that the rejection of the claims by the Primary Examiner be reversed.

Respectfully submitted,

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APPENDIX A

CLAIMS

1. (Original) A process for the regeneration of a supported or unsupported suspension catalyst based on at least one platinum group metal, comprising dissolution of the platinum group metals present in aqueous HCl, using an oxidising agent for platinum group metals, filtration of insoluble constituents and precipitation of the platinum group metals by means of a reducing agent at a pH in the range from 2 to 10,
characterised in that
precipitation is carried out in the presence of a chelating agent for one or more metals from the series of metals of groups 2a, 3a, 4a of the periodic system and transition elements.
2. (Previously Presented) A process according to claim 1,
characterised in that
an unsupported catalyst based on at least 50 wt. % of palladium, 0 to less than 50 wt. % of one or more other platinum group metals and 0.001 % to 10 wt. % of at least one metal capable of forming complexes from the series of groups 2a, 3a, 4a of the periodic system and transition elements without elements of the platinum group is regenerated by carrying out precipitation in- the presence of an at least stoichiometric amount of a chelating agent and moreover at least one of the non-platinum group metals present.
3. (Previously Presented) A process according to claim 1,
characterised in that
the oxidising agent used is chlorine or hydrogen peroxide and the reducing agent used is an aldehyde, particularly formaldehyde, a formate or formic acid, a hydride or hydrogen.
4. (Previously Presented) A process according to claim 1,
characterised in that
the chelating agent is selected from the group consisting of aminopolycarboxylic acids, polyhydroxycarboxylic acids and aminopolyphosphonic acids.
5. (Previously Presented) A process according to claim 4,
characterised in that

the chelating agent is selected from the group consisting of iminodi-acetic acid, nitrilotriacetic acid, ethylenediamine tetraacetic acid, diethylenetriamine pentaacetic acid, amino-tri(methylenephosphonic acid, ethylenediamine tetra(methylenephosphonic acid), diethylenetriamine penta(methylenephosphonic acid), hydroxymethane diphosphonic acid, tartaric acid, citric acid, polyoxycarboxylic-acids (POC) and water-soluble salts of the acids.

6. (Previously Presented) A process according to claim 1,
characterised in that

precipitation of the platinum group metal(s) is carried out with a reducing agent selected from the group consisting of formaldehyde, formate and formic acid, the pH being raised continuously or in stages from 2 to 3 to 8 to 9 during the addition of the reducing agent.

7. (Previously Presented) A process according to claim 2,
characterised in that

the oxidising agent used is chlorine or hydrogen peroxide and the reducing agent used is an aldehyde, particularly formaldehyde, a formate or formic acid, a hydride or hydrogen.

8. (Previously Presented) A process according to claim 2,
characterised in that

the chelating agent is selected from the group consisting of aminopolycarboxylic acids, polyhydroxycarboxylic acids and aminopolyphosphonic acids.

9. (Previously Presented) A process according to claim 3,
characterised in that

the chelating agent is selected from the group consisting of aminopolycarboxylic acids, polyhydroxycarboxylic acids and aminopolyphosphonic acids.

10. (Previously Presented) A process according to claim 2,
characterised in that

precipitation of the platinum group metal(s) is carried out with a reducing agent selected from the group consisting of formaldehyde, formate and formic acid, the pH being raised continuously or in stages from 2 to 3 to 8 to 9 during the addition of the reducing agent.

11. (Previously Presented) A process according to claim 3,
characterised in that

precipitation of the platinum group metal(s) is carried out with a reducing agent selected from the group consisting of formaldehyde, formate and formic acid, the pH being raised continuously or in stages from 2 to 3 to 8 to 9 during the addition of the reducing agent.

12. (Previously Presented) A process according to claim 4,
characterised in that

precipitation of the platinum group metal(s) is carried out with a reducing agent selected from the group consisting of formaldehyde, formate and formic acid, the pH being raised continuously or in stages from 2 to 3 to 8 to 9 during the addition of the reducing agent.

13. (Previously Presented) A process according to claim 5,
characterised in that

precipitation of the platinum group metal(s) is carried out with a reducing agent selected from the group consisting of formaldehyde, formate and formic acid, the pH being raised continuously or in stages from 2 to 3 to 8 to 9 during the addition of the reducing agent.

EVIDENCE APPENDIX - B
DEFINITIONS FROM:

Wikipedia
Dictionary.com
MSN Emcarta

Chelation

From Wikipedia, the free encyclopedia
(Redirected from Chelating agent)

Chelation (from Greek *χηλή*, *chelē*, meaning claw) is the process of reversible binding of a ligand, the **chelator** or **chelating agent**, to a metal ion, forming a metal complex, the **chelate**.

Chelators are used in chemical analysis, as water softeners, as preservatives, and in medicine (chelation therapy), where they are employed to safely bind with poisonous metal agents such as mercury, arsenic, or lead in order to stabilize them and allow them to be excreted without further interaction with the body. Natural chelators include the porphyrin rings in hemoglobin or chlorophyll and the Fe^{3+} chelating siderophores secreted by microorganisms, and are contained in herbs such as cilantro, which has long been used as a treatment for heavy metal poisoning. A commonly used synthetic chelator is EDTA.

A chelator does not have to be organic. In contrast to the simple monodentate ligands like H_2O or NH_3 , which are easily broken apart by other chemical processes, the polydentate chelators form multiple bonds with the metal ion, resulting in more stable complexes.

Metal complexes are of widespread interest and studied by inorganic chemists, physical and organic chemists, biochemists, pharmacologists, molecular biologists, and environmentalists.

Antibiotic drugs of the tetracycline family are also chelators of Ca^{2+} and Mg^{2+} ions and are incorporated into bones and teeth.

In ecology chelation compounds are related to the mobilization of metals in the soil, the uptake and the accumulation of metals into plants and micro-organisms and as a mechanism for resistance and hyperaccumulation adaptations. Such chelation of heavy metals can be used in bioremediation.^[1]
(http://en.wikipedia.org/wiki/Chelation#endnote_ecology)

The term *chelate* was first applied in 1920 by Sir Gilbert T. Morgan and H. D. K. Drew in J. Chem. Soc., 1920, 117, 1456, who stated: "The adjective chelate, derived from the great claw or *chele* (Greek) of the lobster or other crustaceans, is suggested for the caliperlike groups which function as two associating units and fasten to the central atom so as to produce heterocyclic rings."

See also

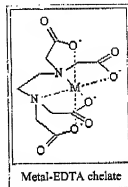
- Bioremediation
- Chelation therapy
- Electron counting
- Organometallic chemistry

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1. ^ Prasad (ed). Metals in the Environment. University of Hyderabad. Dckker, New York, 2001

Retrieved from "<http://en.wikipedia.org/wiki/Chelation>"

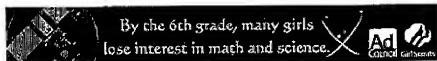
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[Dictionary](#) - [Thesaurus](#) - [Encyclopedia](#) - [Web](#)Top Web Results for "chelating agent"**1 entry found for *chelating agent*.****Main Entry: *che-lat-ing agent*****Pronunciation:** 'kE-'lA-ti{ng}-**Function:** *noun***:** any of various compounds that combine with metals to form chelates and that include some used medically in the treatment of metal poisoning (as by lead)Source: Merriam-Webster's Medical Dictionary, © 2002 Merriam-Webster, Inc.

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chelating agent

cheiropiasty
cheiropompholyx
Cheklang
chela (1)
chela (2)
chelate (1)
chelate (2)
chelated mineral

chelating agent

chelicera
chelicerate
cheliform
Chelmsford
chelonian
Chelsea
Chelsea bun
Chelsea
pensioner

che-lat-ing a-gent (*plural* che-lat-ing a-gents)

noun

Definitions:

substance that forms a chelate: a chemical that combines with a metal to form a chelate. Use: treatment of metal poisoning.

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